







Spray Quality Monitor for Informed Pesticide Applications

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Background

- Provide real-time data acquisition of measured spray particles within pesticide spray application
- Current methods are costly and not applicable for real-time measurements
- Referencing spray card datasheets in which the Volume Median Diameter (VMD) ASABE S572.1 of a pesticide spray particle is used to classify the spray
- Environmental disturbances and changes in the flow rate of the applicator influences the particle size distribution



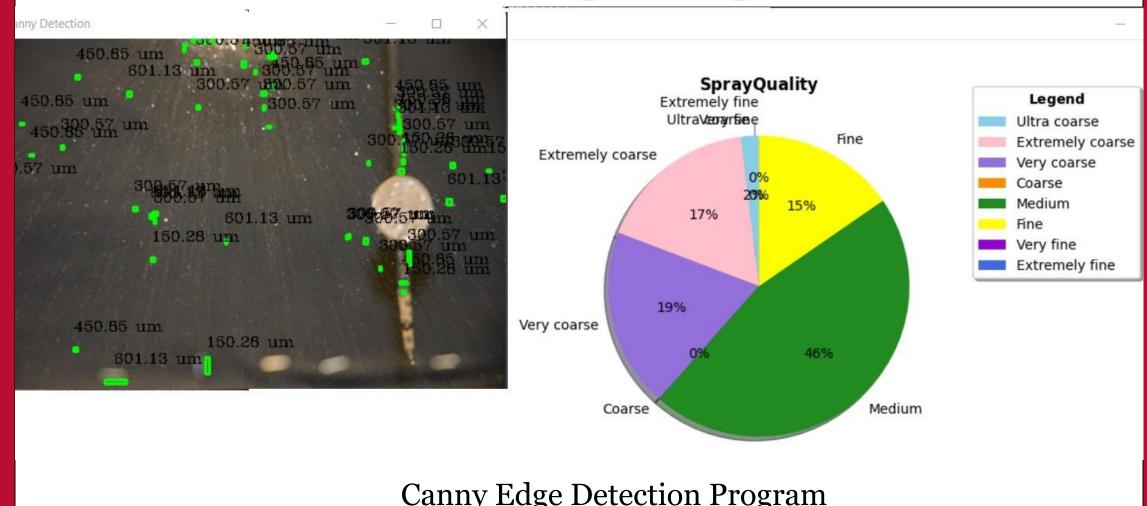
Boom Sprayer

Goals

- Design affordable accurate device capable of measuring VMD of pesticide spray
- Create software that can measure spray distribution in real time
- Display spray distribution on easy to learn interface
- Display accurate spray quality data applicators allowing them to make a more informed decision while applying

Progress

- Test stand capable of recreating pesticide spray
- Determined our design direction through design matrices
- Researched all current designs to gain information on best approach
- Researched and tested the best camera with best lens
- First camera ordered shutter speed was not fast enough to capture individual droplets without trail.
- Second camera is monochromatic which increases the processing rate
- Quarter was used to determine the conversion factor in pixels per inch



Canny Edge Detection Program

Materials

- MCP3008 8-Channel 10-Bit ADC With SPI Interface
- Raspberry Pi 4 Model B 2 GB RAM
- DS18B20 Digital temperature sensor + extras
- Anemometer Wind Speed Sensor w/Analog Voltage Output
- Raspberry Pi HQ Camera
- 16mm 10MP Telephoto Lens
- Full Sized breadboard
- Assembled Pi T-Cobbler Plus GPIO Breakout Pi A+, B+, Pi 2/3/4, Zero
- Aluminum Heat Sink for Raspberry Pi 3 or 4 15 x 15 x 15mm
- 5V 1A (1000mA) USB port power supply UL Listed
- USB cable USB A to Micro-B 3 foot long
- SD/MicroSD Memory Card (8 GB SDHC)
- TeeJet Red Acetal-Stainless Steel Even Flat Spray Tip Nozzle
- Break-away 0.1" 2x20-pin Strip Dual Male Header

Images



Prototype Setup



Test Stand Setup



Nozzle Selection Chart